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The Magazine for Customers of the Turck Group



## Triple Play

New HMI series provides a PLC, visualization and outstanding communication functionalities



## Linear Leader

Inductive sensor family can replace magnetostrictive and potentiometric linear displacement sensors



### Recipe for Success

"Innovativeness and quality must be right," says Ulrich Turck

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## Real Innovations



Traditionally, the automation industry considers the SPS/IPC/Drives trade fair as the year's grand finale. This year – probably being the most turbulent year in many companies' history – won't be an exception. Sales decreases of 20 to 30 percent or more characterized entire industries – from the automotive industry to the engineering industry. Unfortunately, Turck wasn't spared the turbulences.

In times like these, it's understood that companies calculate a lot to take even more efficient steps on the future path. Although we decided to reduce costs and optimize internal structures on the one hand, we decided to retain our strong focus on you, our customers, on the other hand. As your solution vendor we can only be successful if we evolve with your demands and continuously present new innovative solutions for your applications. Having said this, we are looking forward to presenting numerous innovations and enhancements to you – despite the turbulent times.

One of the highlights that we have presented at the SPS/IPC/Drives trade fair in November is a new linear displacement sensor that does not require a magnetic positioning device. Instead, the position is detected via an inductive resonator. The LI series provides a real benefit, as it can replace any magnetostrictive or potentiometric measuring solution. Speaking of additional benefits: We are happy to launch the first model of our new product line of human machine interfaces (HMIs) in these days. The VT250 not only provides visualizing and controlling functionalities, but also outstanding communication characteristics for communication between fieldbus systems and real-time Ethernet.

You can get more detailed information about these innovations from this edition of our customer magazine, directly on-site from our sales specialists or on the internet on [www.turck.com](http://www.turck.com). We are looking forward to meeting you!

**Warmest regards**

A stylized, handwritten signature in black ink, consisting of a series of loops and a final downward stroke.

**Christian Wolf, Managing Director**

more@**TURCK**



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## Brighter Prospects



► The **Turck-Group** is anticipating a consolidated turnover of approximately 270 million Euros for the current fiscal year. Compared to 2008, this is a decrease of about 27 percent. "This fiscal year's result is strongly influenced by our prime markets in the automotive and machine building industry," announced Christian Wolf, Managing Director with the Hans Turck GmbH & Co. KG, at Turck's annual press conference. "We are anticipating slightly increasing sales with a solid single-digit growth rate." Wolf said that despite the inevitable economy measures, Turck's customers can rely on the automation specialist's solution know-how.

## Temperature Compensation



► A new series of ultrasonic sensors provides considerably more accurate measuring data than comparable products available. The IP67 rated **T30UX** sensors allow measuring ranges of up to three meters, and their short blind zone of ten percent of the maximum range enables users to apply the sensor to applications in the automotive sector, the paper industry, the pharmaceutical industry and several other sectors.

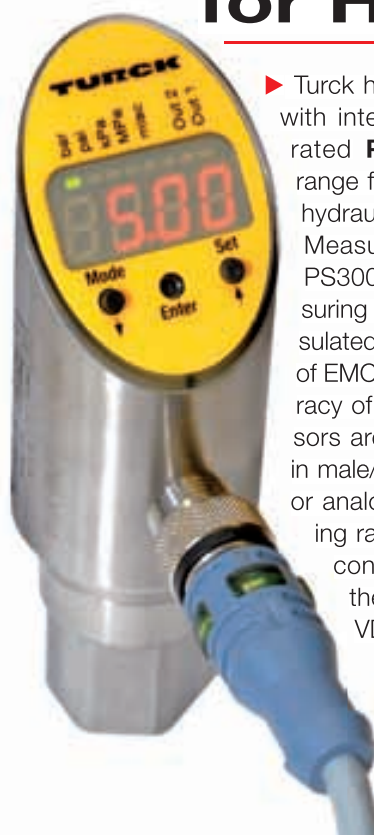
## Turck now offers HMIs

► In addition to comprehensive sensor, fieldbus, interface and connectivity solutions, Turck is now offering a new line of **human machine interfaces (HMIs)**. The first model, VT250, was presented at the SPS/IPC/Drives show in Nuremberg; additional models will follow in 2010. Turck's new HMIs provide visualization, controlling and variable gateway functionality for communication between fieldbus structures and real-time Ethernet. The VT250 may be configured as a master or slave – regardless of the communication direction. Based on open standards like CoDeSys and FDT/DTM, the new HMIs guarantee cost-effective interface solutions with outstanding communication characteristics. The VT250 provides a 5.7" TFT touch-screen (QVGA) in a compact 212 x 156 x 50 mm housing. On the back side, Turck's developers integrated an SD memory card slot, a back-up battery and the fieldbus port that may be configured for Profibus or CAN bus communication (using DeviceNet or CAN-open). The kicker: Providing two real-time Ethernet ports, the VT250 allows

the user to set up a line topology. A communication port supporting RS232 and RS485 and the additional USB port complete the versatile communication package. [more on page 20 ►](#)



## Pressure Sensor for Hydraulics



► Turck has introduced a new line of pressure sensors with integrated evaluation units. The rugged, IP69K rated **PS300** sensors provide a wide measuring range from -1 to 600 bar and are perfectly suited for hydraulic applications – even in harsh environments. Measuring signals are directly processed on the PS300's newly developed high-build pressure measuring cell and digitally transferred to the fully encapsulated evaluation unit. This design offers a high level of EMC resistance and an excellent switch point accuracy of 0.5 percent of the full scale. The PS300 sensors are available in G1/4" female thread version, or in male/female 1/4"-NPT or R1/4" versions with digital or analog (voltage or current) outputs for all measuring ranges. Bonded seals ensure a reliable process connection. The new pressure sensors support the I/O-Link communications standard, and the VDMA menu structure is available upon request.

## New Structure

► Turck has restructured its existing product management divisions, Sensor Technology, Fieldbus Technology and Process Automation, in two new business units: **Automation Products** and **Automation Systems**. Based on the new structure, Turck plans to extend its pre- and after-sales support



**Oliver Marks**

and utilize synergistic efforts. In this way, platform strategies, for example, may be developed corporately to a certain degree and complemented with specific PA or FA parts just before completion. This allows optimal customization for the specific markets.



**Norbert Gemmeke**

The new business units are headed by **Oliver Marks (Products)** and **Norbert Gemmeke (Systems)**.

## Interface Module Efficiency

► Turck's new **IME (Interface Module Efficiency)** series allows energy savings of up to 32 percent for loop-powered isolating transducers and an economic price per channel. The new product line focuses on signal processing and provides all essential functionalities and a high signal quality. Furthermore,

Turck offers the IM-series for special requirements, such as terminal clamps or data logger functionalities.



## Inductive Linear Displacement Sensor

► For the first time ever, Turck has combined the benefits of magnetostrictive and potentiometric technology with its new series of linear displacement sensors. The new **LI-Q25** series is an interference-free solution for measuring ranges between 100 and 1.000 mm. The analog sensors provide a 1 µm resolution and are specially suited for applications that could not otherwise be solved efficiently due to technical restrictions, such as metal-processing machines, rolling mills or injection molding machines. The IP67-rated sensors are based on the resonator principle. Unlike magnetostrictive or magnetic inductive position sensors, the LI-Q25 does not require a magnetic positioning device. Instead, the position is detected via a resonant circuit. In this way, splinter accumulations that can affect the sensor's function are eliminated. Moreover, having a completely sealed housing prevents dirt or dampness from affecting the rugged sensor.

[more on page 08 ►](#)

## Retro-reflective Sensors

► A new line of high-performance retro-reflective sensors detects and counts clear, translucent or opaque objects. The **QS30ELVC**, developed by Turck's strategic partner Banner Engineering, guarantees fast and reliable sensing performance with irregularly shaped objects or those with reflective surfaces. With a 500 microsecond response time, the sensors are perfectly suited for applications in industries,

such as the pharmaceutical and food industry (e.g. sensing of translucent plastic packaging), the semiconductor industry or the electronics industry. Thanks to an automatic algorithm that compensates for dust, contamination and ambient temperature changes, the IP67 rated sensors can be used in harsh environments too. The new sensors provide three selectable thresholds to optimize performance for a wide range of



objects being detected. Setup is as easy as aligning the sensor with its target and pushing a "teach"-button to set the switching point.

## Key Account Management

► **Ryan Kromhout** has assumed the new position of Turck's Director Key Account Management Process Automation. The process automation specialist has assumed the



**Ryan Kromhout**

responsibility for all key account activities worldwide. Well-directed coordination is required by the increasing demands of globally operating PA customers. "As a specialist for the physical layer, we are trying to pool our know-how worldwide to provide it to our customers as an integrated resource," Kromhout explains.

## For Larger Pipe Diameters



► ATEX-certified flow sensors for gaseous media, **FCS**, are now available with extended probe lengths of 100, 140 and 220 mm. The extended probes significantly enhance the sensors' functionality by allowing users to install the sensors in pipes with diameters of up to 440 mm. The IP67 rated stainless steel sensors are certified for gas Zone 1 and can simply be installed in the tube via a tee connector. Based on the thermo-dynamic principle, the sensors reliably detect the flow status of gaseous media, like air, by evaluating the flow-induced temperature difference between the heated probe and the medium.

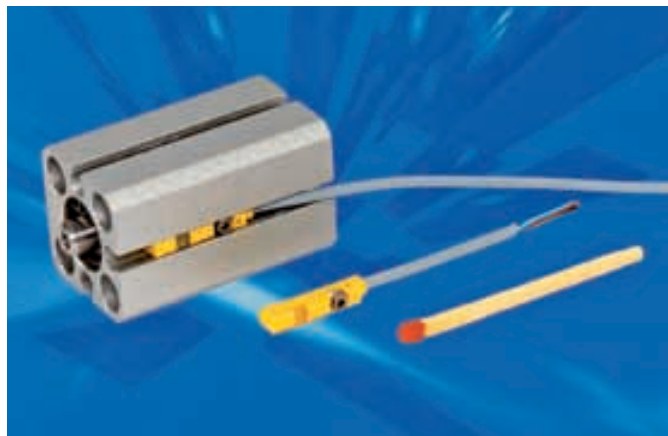
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## Mini Magnetic Field Sensors

► Turck extends its range of magnetic field sensors with a new, fully electronic miniature-sized sensor for position detection on even the smallest pneumatic cylinders. With a height of only 4.6 mm and a total length of only 18 mm, the **BIM-UNR** is perfectly suited for all current rounded groove cylinders. Mounting this compact sensor is as easy as can be: Simply insert the sensor into the groove from above and secure it via the integrated 1.5

mm hexagon socket thumb screw. A quarter-turn is all it takes. The vibration-proof mounting keeps the sensor from lifting if the cable is moved. Being completely counter-sunk in the groove, the new BIM-UNR is totally insusceptible to mechanical interference. Moreover, the magnetic field sensor guarantees optimal

response characteristics, because its sensor element is located at the bottom of the groove – as close to the magnet as possible. Despite its compact housing, Turck's new magnet field sensor provides a clearly visible LED that reports the switching status on-site.



## Wireless Completed

► Turck has completed its wireless portfolio for industrial use in the factory and process automation markets. In addition to its point-to-point solution, **DX70**, and the network version, **DX80**, the automation specialist is now offering the new **DX99** series with ATEX approval for Zone 0. A new **solar panel** providing self-sufficient power supply for external devices completes the wireless portfolio. The wireless series, developed by Turck's partner Banner Engineering, is the most comprehensive and flexible wireless solution for industrial use worldwide. Possible applications include integration of expensive-to-access remote fill level control systems, substitution of abrasive rings at rotary indexing tables



or wireless communication for driver-less transport systems. Turck's wireless series supports various signal types, from analog signals, to binary contacts or frequency signals, to digital protocols via RS232 or RS485.

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## Industrial Engineering News IEN EUROPE

**Application: Turck / SENSORS FOR WELDING AND ASSEMBLY**

**Technology Special: Test & Measurement, Sensors**  
Discover new and innovative products and solutions for your applications.  
→ page 10 ff

**In this Issue +110 new products**

**Motors, Drives & Motion Control**  
Position control unit designed to control brushless DC motors.  
→ page 18

**THOMAS**

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The new website offers an improved, comprehensive online experience with data sheets, videos, etc. → page 19

**Pilz / Safety Relay**  
The new configurable safety relay was developed for use in stand-alone machines. → page 6

**Siemens / Servomotors**  
The servomotors are suitable for use in applications involving high and variable load inertia. → page 30

**CONTRINEX**  
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Peter Heimlicher, CEO at Contrinex, talks about applications for inductive sensors, RFID technology, and the IO-Link standard... → page 8

**RAMOHT**

**RAMOHT**



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Webcode | **more30900e**

The LI-Q25 detects  
an object's position  
via a resonant  
positioning device,  
not with magnets

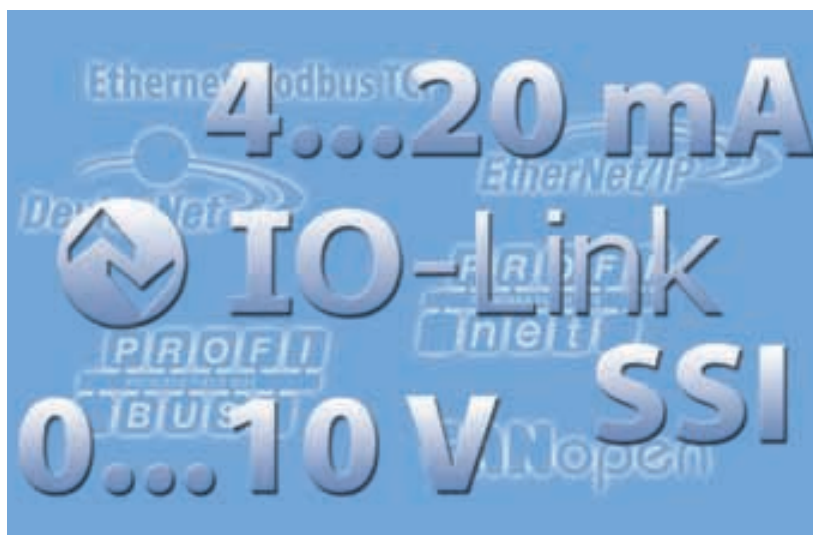


## Linear Leader

Turck's new inductive sensor family can replace more expensive magnetostrictive linear displacement sensors, as well as interference-prone potentiometric solutions

**U**ntil now, an inconvenient truth could be applied to most linear displacement sensors: They were either low-priced and prone to wear (potentiometric solutions), or they were wear-free and accurate but expensive (magnetostrictive systems). Although there are different methods for position detection – ranging from

analog sensors, to incremental devices, to digital switches – virtually no linear displacement sensor could efficiently be applied to short-range and long-range applications alike. Turck has changed all this with the introduction of a new series of powerful linear displacement sensors based on the resonant circuit technology, the LI series.



The LI series provides output signals in four different formats: 0 to 10 V, 4 to 20 mA, IO-Link or SSI

where chippings or external magnetic fields might affect the sensor's functionality. Injection molding machines require the operator to verify the locking device's movement, locate the injection unit, check the ejector's motion and measure the holm's strain: diverse tasks Turck's noise- and wear-free inductive linear displacement sensors are particularly suited for.

The versatile LI sensor series helps users to optimize their application and increase the machine's availability. Turck's linear displacement sensors are also suited for welding machines, as they are absolutely insensitive to strong magnetic fields that occur during welding processes. This feature allows users to utilize inductive linear displacement sensors in various applications like machine tools, molding presses, rolling machines, die-casting, bending or lining machines, dosing systems, mixing units, packing machines, wind turbines or stroke and alignment control systems.

### Resonating positioning device

Unlike magnetostrictive or conventional inductive position sensors that use magnets to detect position, the LI-Q25 detects an object's position via a resonant positioning device. The functional principle: A transmitter coil integrated into the IP67-rated

The new inductive linear displacement sensors provide a 1 µm resolution and are less expensive than most of the conventional sensor solutions available on the market. Whether measuring ranges of only 100 mm or up to 1,000 mm, the sensor's flexibility allows users to apply it to diverse applications like injection molding machines or metal working,

#### ► Quick read

Based on the resonant circuit principle, Turck has developed new linear displacement sensors that allow users to apply position detection to various new applications – more efficiently than existing solutions.



**Maintenance-free:** Due to their rugged housing, Turck's IP67-rated sensors are insusceptible to moisture

housing generates a high-frequency alternating magnetic field that activates the resonator integrated into the positioning device. Each time the transmitting coil stops transmitting, the resonator induces voltage into two receiving coils integrated into the sensor. The voltage intensity depends on where the positioning device overlaps the receiving coils. An integrated 16 bit processor provides a corresponding proportional output signal in different formats: 0 to 10 V, 4 to 20 mA, IO-Link or SSI.

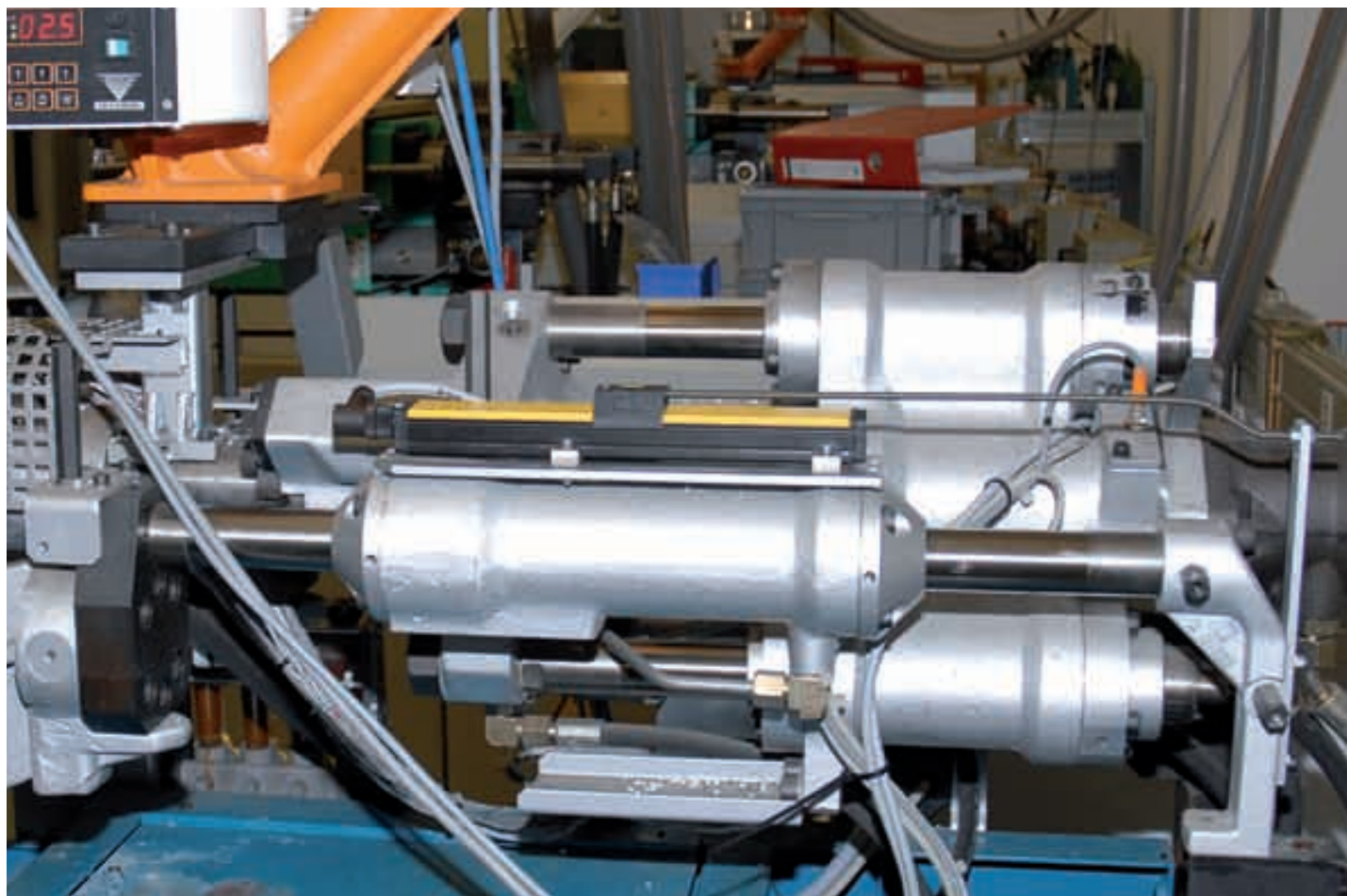
Unlike magnetostrictive sensors, this resonant circuit principle is completely immune to external electromagnetic fields and since there are no magnets involved, splinters that may affect the sensor's function do not accumulate on the positioning device. Unlike potentiometric detection solutions, not even dirt or dampness affect the sensor – thanks to a fully sealed housing. Moreover, the coils' special design guarantees that the output signal is not affected by the distance between the sensor and the positioning device. Because of this, measuring errors caused by slight deviations are effectively eliminated, as long as it is within the sensors 0 to 4 mm measuring range.

### Easy to adapt

Due to their resistance to interference and high accuracy, the wear-free LI sensors can replace potentiometric solutions, as well as the more expensive magnetostrictive systems, in a lot of applications. The linear displacement sensors include features that make them easy to apply in many areas. Opposite to the active sensing face, the sensor housing features an aluminium profile that allows easy application via optional mounting accessories, and stainless steel accessories provide safe mounting and flexibility with regard to the alignment of the sensor.

Extremely short blind zones of only 30 mm on each side, along with a wide temperature range of -25 to 70 °C and the option to adopt the sensor by programming it to different measuring ranges, allows users to dispense with special variants for specific applications. Using only one sensor family for measuring ranges between 100 and 1,000 mm simplifies warehousing and helps users reduce their total cost of ownership.

Users can rely on Turck for the most versatile linear displacement solution for their application. Turck developed the new sensor family true to their motto "Sense it, Connect it, Bus it, Solve it" – meaning that flexible output configurations allow the sensor to be easily integrated into existing automation structures. Whether the application calls for an analog output, IO-Link or SSI, a standard M12x1 connector provides a convenient connection to a wide range of fieldbus installations, including Turck's BL20, BL67 and BL Compact families. In particular, IO-Link provides numerous advantages with respect to commissioning, maintenance and warehousing.



**Pilot application:  
Four Turck LI  
sensors on an  
injection molding  
machine**

### Three-wire technology advantage

Based on the popular three-wire technology, the IO-Link standard enables users to commission their intelligent field devices faster and maintain them more conveniently. Requiring only one cable for data transmission and power supply, IO-Link simplifies connection diagrams and reduces cabling expenses, in addition to allowing users to download device parameters from one sensor to an identical replacement sensor. In this way, cumbersome manual parameterization on site becomes redundant. Since IO-Link sensors may provide additional diagnostics data via the combined process/configuration data channel, failures can be localized faster – allowing plant operators to reduce machine downtime significantly.

Turck provides a corresponding driver – the device type manager, DTM – for its new LI-Q25 series. Allowing user-friendly visualization via a non-proprietary software tool like PACTware, DTM enables users to manage and parameterize their intelligent sensors with only a few mouse-clicks.

### Successful pilot project

The German connectivity company, Escha, has implemented the LI series a few months ago, and the sensors have been delivering optimal perfor-

mance under harsh operating conditions. Cooperating with the mechanical engineers of the machine builder, Turck's sensor specialists replaced four existing potentiometric measuring devices with LI-sensors in one machine. In this machine, the sensors guarantee safe and reliable detection of a locking device, ejector, injection unit and holm strain. "One of the most significant advantages of Turck's IP67 sensors is their rugged housing that makes them insusceptible to moisture," says Markus Hühn, head of the connector production department with Escha Bauelemente GmbH in Halver. "The contact-free sensor works maintenance-free. Turck's new sensors have been meeting our expectations completely."

### Closing the gap

Based on the resonant circuit principle, the new inductive position sensors can be used in a wide area of applications that could not be solved efficiently in the past. Whether an application contains short or long-range distances, limited installation space or external interferences – Turck's new linear displacement sensor offers a flexible solution that can easily be applied to various applications, closing the gap between functionally limited potentiometric solutions and complex magnetostrictive position sensors. ■



**“Turck's new sensors have been meeting our expectations completely.”**  
**Markus Hühn,  
Escha**



The individual structure of a family enterprise certainly is a solid basis for good ideas, says Ulrich Turck

## „Innovativeness and quality must be right“

Ulrich Turck talked to Harald Wollstadt, editor in chief of IEE magazine, about the family enterprise, its formula for success and its challenges

**Turck had began as a vendor for sensor technology, but the enterprise has adopted numerous new products during its company history – from interface technology, to connectivity solutions, to fieldbus technology and programmable gateways. What's next?**

We are still achieving the lion's share of our sales with sensor solutions. In addition to these products, we have long since been developing successful interface and fieldbus solutions for the factory and process automation markets. Having a comprehensive know-how in these

fields, we have been able to develop an RFID system. This system, BL ident, was one step we took from being a component supplier to becoming a solution vendor. Another step has been made with our programmable gateways that provide controlling functionalities for fieldbus nodes. The next milestone will definitely be our new human machine interfaces (HMIs).

**■ When will you take this next step?**

We are presenting the first HMI model, VT250, at the SPS/IPC/Drives fair. Our first HMI not only provides visualizing and

controlling functionalities, but also outstanding communication characteristics for the communication between fieldbusses and real-time Ethernet. Ultimately, this is what users can expect from Turck. The VT250 can be configured as master or as slave – no matter the communication direction – and standards such as CoDeSys or FDT/DTM guarantee an open interface solution made in Germany.

**■ Do you think becoming a comprehensive solution vendor has been your formula for success?**

It certainly is an important criterion to be able to offer solutions with additional benefits, but innovation and quality must be right – regardless of whether we develop a component or a comprehensive solution. This is why we don't stop developing new sensor solutions. Another highlight at the SPS/IPC/Drives fair is the introduction of our new inductive linear displacement sensor that enables users to replace all existing magnetostrictive or potentiometric measuring solutions. These sensors do not rely on magnetic locators, but on the resonating principle. This principle guarantees a fault-free operation even in environments where metallic splinters may occur.

**Sensor technology made in Germany is regarded to be top-notch worldwide. What's the secret to its success?**

German sensor businesses are prominent in the American market, as well as the growing markets in China and India. If you add the market shares from the four largest German sensor manufacturers, it results in a distinct majority of the market. Turck is the leading producer of inductive sensors in the United States and China. We are in this position because of our technological know-how and our close contact with our customers. Fifteen years ago, Turck developed the first factor-1 sensor on the market, uprox, that features the same switching distance for all types of metal. This sensor has enabled customers to apply a single sensor to various applications. You can't simply reproduce such innovative products – and that is why German manufacturers are still very successful.

**Does product development competency and training contribute to this success?**

You have to master the technology in all its particulars. On the one hand, a highly precise product with low tolerances is necessary. Changing the housing material composition only slightly might produce a different response, for example. But the employees have to be up-to-date on all the latest technological advancements as well – regardless of whether they are an engineer or machine operator. In the end, it's the combination of manufacturing quality and employee know-how that's led to Turck's success.

**How much do you spend for research and development?**

To keep introducing innovative products that meet our customers' demands, we spend approximately ten percent of our turnover on research and development.

**Do customers directly account for certain developments?**

More than 80 percent of all new product ideas emerge from the close cooperation we have with our customers. Helping customers with product development is ideal, as it improves our ability to provide customers with effective solutions. This is what we achieved with respect to fieldbus technology. We developed our first proprietary fieldbus system, Sensorplex, in cooperation with Ford in 1988. Now, we are offering four product families for each and every fieldbus protocol.

**Turck differentiates between two big product fields – factory and process automation. How do these fields contribute to sales?**

Factory automation dominates sales with approximately 75 percent, while process automation contributes around 25 percent of our sales. Nevertheless, we are currently experiencing the best growth rates in the field of process automation.

**Which new industries do you expect to grow in the next ten years?**

There's a lot of potential within our three fields of focus. Nevertheless, we keep an eye on country-specific industries, such as the Chinese tobacco industry in which we were able to achieve a remarkable turnover. The textile industry in China and India is another interesting market for Turck. We try to preserve a certain degree of flexibility – in addition to our corporate strategy. Developing application-oriented solutions for our customers is definitely one of Turck's talents, but you should always beware of forcing a leading position on certain markets.

**How have you dealt with the financial and economic crisis?**

We are trying to overcome the crisis with intelligent ideas that enable us to open up new market opportunities, for example in the chemical and pharmaceutical industries. Being innovative means recognizing new ideas. And new ideas can only be called innovative if they define new standards that improve the customer's profitability. The individual structure of our family enterprise certainly is a solid basis for good ideas. ■



” Turck is the leading producer of inductive sensors in the United States and China. We are in this position because of our technological know-how and our close contact with our customers. “

Ulrich Turck



” More than 80 percent of all new product ideas emerge from the close cooperation we have with our customers. “

Ulrich Turck

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Webcode | **more30940e**



This villa in Zwolle  
is one of the  
most beautiful  
Turck locations

## Gas and Cheese

As a solution partner, especially for the oil & gas and the food industry, Turck B.V. has been successful in the Netherlands for 20 years



### ► Quick read

Having a land area of only 41.500 square kilometers – of which one-fourth is below sea level – the Netherlands is not exactly a big state. Nevertheless, the country is the world's third largest exporter of agricultural commodities. Quite a few of these products are produced with the help of Turck products – thanks to the staff of Turck's Dutch subsidiary, Turck B.V.

A quite street, large trees, gardens and a historic villa build in 1862 – a place that could easily be the setting for a romantic historic movie – is actually the headquarters of Turck's Dutch subsidiary, Turck B.V., in Zwolle. For twelve years, Managing Director Wim Landman and his 26 member staff work in a villa that – in its time as a hotel – accommodated General Montgomery and Prince Bernhard.

As one of the original team members, Landman strongly influenced Turck B.V.'s success. Even before the actual subsidiary was founded in 1990, Landman was responsible for promoting Turck's product solutions as a staff member at a sales agency that had represented Turck since 1975. Together with Bertus Moerland, the first Managing Director, and a personal assistant, Landman built Turck B.V. in the early 1990's; as Managing Director, Landman has been running the show since 2001.

From its modest beginnings – the first annual turnover only amounted to some 100,000 Euros – Turck B.V. has developed into a successful subsidiary that contributed more than seven million Euros to Turck's 2009 total turnover. Despite the worldwide market crisis, Turck B.V.'s sales decrease turned out to be more moderate than other subsidiaries' sales decreases.

### Recipe for success: flexibility

Turck B.V. primarily supplies customers in the food industry, although the oil & gas sector plays an important role too. The Dutch subsidiary traditionally has been in close contact with the food industry – and especially to cheese dairies and creameries. In the early 1980's Landman began to offer Turck's innovative sensor solutions that most competitors were not able to provide until years later. "Nowadays, virtually each and every cheese product from the Netherlands is produced with the help of Turck," explains Landman. "Animal feed plants, meat processing plants, machine and engine builders and various breweries in the Netherlands rely on Turck's innovative products as well."



“Customers trust us and some have been with us for 25 years.”

**Wim Landman,**  
Turck B.V.



**Over 60 percent of all orders are supplied directly from the subsidiary's own warehouse in Zwolle**

Turck B.V.'s flexibility plays an important role for the subsidiary's success. The 26 staff members handle consulting, service and product sales for sensor, fieldbus or interface solutions from Turck, photo-electric sensors or vision technology from Turck's strategic partner, Banner Engineering, or connectivity solutions from Escha. Turck B.V. works with the entire range of customer profiles - from international companies to engineering consultants on the corner down the street. Eight employees are on the road in the sales force. Three product managers provide consulting services – one for Banner products, two for automation.

### **Fast service guaranteed**

Turck B.V. can respond to requirements quickly, as over 60 percent of all orders are supplied directly from the subsidiary's own warehouse in Zwolle. Because of this, customers normally receive their products only one or two days after making an order. "Our procedures and our own standards are paying dividends," Landman explains. "Customers trust us and some have been with us for 25 years. Customers can rely on us; we think with the customer on even the smallest issue, and are willing to visit customers to help them find solutions to their issues."

Additionally, a comfortable work environment promotes good interaction with customers. "The fact that members of staff get along well with each other and enjoy themselves has a positive effect on our customers," says Landman. Of course, the villa's historic ambience contributes to the staff's contentment as well as it fits perfectly to a family-owned business.

### **RFID and wireless**

Despite its success, Managing Director Landman aims high with respect to Turck B.V.'s future. The subsidiary's product range has continuously been extended and Turck B.V. has been developing from a product supplier to a solution vendor. Landman explains, "Although we have a good market share with certain product lines, such as sensors or interface technology, there are some new products for which we need to gain a better foothold, such as the RFID technology. We already acquired new customers with our RFID system, BL ident, but we would like to convince even more customers of the system's performance. The same applies to the wireless technology: We have got the most comprehensive and flexible wireless solution for industrial applications worldwide. This is why I am pretty confident that we will acquire numerous new customers in the near future." ■

**TURCK****PROCESS  
AUTOMATION**

# ASSET MANAGEMENT ENABLED

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Isolation, conversion, processing, transformation and conditioning of analog signals. TURCK offers a large variety of devices in different housing styles, from DIN rail over 19"-cards to special housing designs.

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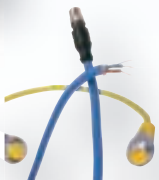
- **Efficient fieldbus solutions**

From the multibarrier to connectivity technology, TURCK customers can choose from a comprehensive product portfolio for FOUNDATION™ fieldbus and PROFIBUS-PA.

- **High-performance diagnostic tools**

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**FIELDBUSES****REMOTE-I/O****INTERFACES****WIRELESS****RFID****CONNECTIVITY**

**Point to Point! Point to Bus! Bus to Bus!**

## Author

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**Tag in the box:** Rugged data carriers attached to the trolleys may stay with the object during the autoclave process



# RFID Under Pressure

RFID systems featuring rugged data carriers (tags) enable users in the food and animal feed industry to make challenging processes more efficient

**H**igh ambient temperatures of up 140 °C, humidity and ambient pressures are not exactly favorable environmental conditions for electronic components. In fact, autoclaves are one of the most challenging applications in the food and animal feed industry for a good reason: autoclaves cook food or feed very efficiently and preserve the packed consumables at the same time. Only a consistent track-and-trace system that provides information about each and every processing step enables users to fully integrate this challenging application into their production chain. And only a rugged and versatile identification solution allows such a consistent track-and-trace system.

In order to know exactly where each and every intermediate or final product is at any time – enabling the user to implement the corresponding processing

steps – users oftentimes rely on conventional optical identification methods, such as barcodes or data matrix codes. Both systems enable users to identify batches between the different processing steps and handle them accordingly. Both identification methods have disadvantages, though. First, printed labels attached externally may become unusable when they are exposed to high temperatures, moisture or dirt. Secondly, neither bar codes nor data matrix codes can efficiently provide more than batch information. In this way, automated identification and production control remain not fully integrated.

## Advantage: RFID

This is where a radio-based identification system, RFID, offers additional benefits. Unlike conventional



special RFID tags and rugged, mobile reading devices enable radio-based identification to be used even under these tough conditions.

## Track-and-Trace

Specially suited to the EU regulation 178/2002 – specifying that “the traceability of food, feed, food-producing animals and all substances incorporated into foodstuffs must be established at all stages of production, processing and distribution [and] that business operators are required to apply appropriate systems and procedures” – Turck is offering corresponding components for its RFID system, BL ident.

Besides glass-coated data carriers (TW-R4-22-B128) for ambient temperatures of up to 140 °C, BL ident is comprised of rugged write-read heads (even for use in washdown areas), food-safe connectivity products and corresponding fieldbus and interface solutions for use in control cabinets (BL20) or directly in the field (BL67). In this way, the comprehensive identification system enables users in the food and feed industry to identify their intermediates and end products at any time – without regard to the environmental conditions.

## Complete package

BL ident does not only help users make individual processing steps more efficient, it also facilitates consistent track-and-trace concepts – reducing downtime and total costs. Attached to containers or trolleys, the IP68-rated data carriers may remain with the objects during the entire production process; relevant data may be retained and retrieved automatically before each processing step, after each step or at the end of the production chain, so that the user can access a comprehensive processing protocol that verifies the complete production process. In this way, the fully automated information transmission between tags, read/write heads and the higher level control system helps make the entire production chain safe and reliable.

Ultimately, even upgrades to the instrumentation or the control system can easily be performed with BL ident, since the modular fieldbus system supports various fieldbus protocols – ranging from Profibus, to DeviceNet, to Ethernet/IP – and different signal types, such as digital I/O, RS232/422/485, or high-speed counters. ■



**The glass-coated data carrier, TW-R4-22-B128, withstands high temperatures, humidity and pressure in autoclaves**

identification systems, data carrier based identification provides much more information about the processed products. EEPROM- or FRAM-based data carriers (tags) with memory sizes of up to several kBytes can provide unique IDs for single objects, information about the most recent processing steps or control data, for example. This data may be read automatically, without time lag and – depending on the type of memory used – up to ten billion times.

Another advantage of radio frequency identification: The transmission of information via electromagnetic radio waves is generally less susceptible to environmental influences. While printed labels may be affected by the harsh conditions in autoclaves,

### ► Quick read

With its RFID system, BL ident, Turck offers a versatile identification solution for use even in tough applications, such as autoclaves. Rugged, re-writable data carriers facilitate more efficient processing steps and consistent tracking systems – significantly increasing machine uptimes and thus opening up new streamlining potentials.

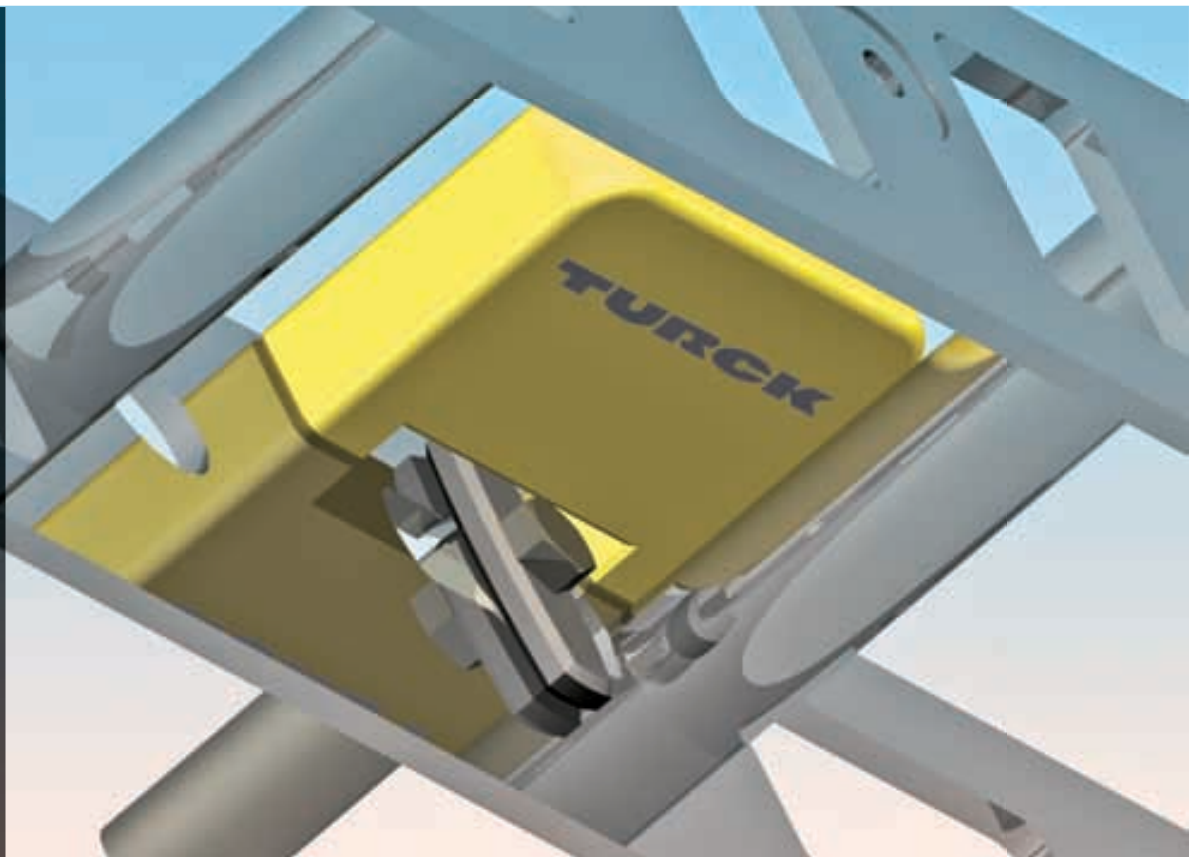
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The inductive sensor  
tag detects the  
traverse and verifies  
its correct locking



# A Special Tag Team

Turck presents RFID data carriers with integrated sensor functionality

**T**urck's RFID system, BL ident, and a formula 1 car have a distinct feature in common: Both are being enhanced continuously to achieve maximum performance. Turck's newest innovations are intelligent data carriers (tags) that not only provide memory space for RFID data, but also integrate sensor functionality. At the SPS/IPC/Drives show, Turck presented the series' first models: A tag with an integrated temperature sensor and a tag with an integrated inductive proximity switch. Additional sensor combinations will be released in the future.

The new sensor tags significantly extend an RFID system's efficiency and may be used in applications that could not be solved efficiently with

existing solutions. For example, when attached to presses or conveyors, the new inductive sensor tags not only allow part identification but also position detection – without additional wiring. Another example: When attached to a traverse that can be docked to a machine laterally, the inductive RFID sensor verifies the correct traverse has been docked and locked accurately by providing a corresponding ID. The temperature sensor tag also allows new applications, for example, in the food or animal feed industry. The new tag helps users to detect the correct process temperature and verify that charges have passed through in accordance with the process.

Turck's new sensor tags – available with or without an integrated power supply – transmit and receive signals within the HF wave band (13,56 MHz). The battery-free tags get their operating energy directly from the electromagnetic field; and those with an integrated power supply can even be utilized as a data logger. The 512 kB memory EEPROM tags are specified for a wide temperature range of -40 to 105 °C, but short-time operation under ambient temperatures of up to 130 °C that might occur in autoclaves won't harm the tags. ■

## Quick read

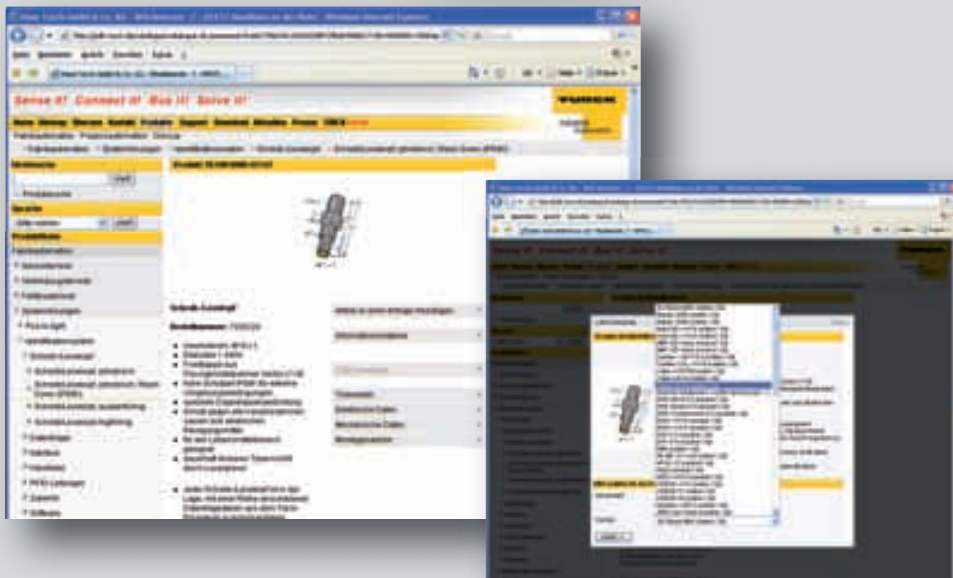
Turck has extended its RFID system, BL ident, with new data carriers that combine memory space for RFID data with an integrate sensor functionality. The first tags with an additional proximity switch or an integrated temperature sensor will be launched in December, 2009. Additional sensor combinations will be released shortly after that.

# Product Data on DVD

Fresh from the press, the new "Full Range" DVD offers you an original view of our product database on the Internet for offline use.



Regardless of what information source you use, the Turck product database on DVD or on the Internet will provide comprehensive information material focusing on Turck solutions for plant and process automation. There you can find data sheets, brochures, catalogs, and even software. Different search functions will help you find the right solution for your automation needs.



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No problem! Simply generate the data record that you need in our product database on the Internet – you can choose from between 80 export formats in 2D and 3D. This service is absolutely free, registration is also not required.

# Product Data on the Web

The Turck product database on the Internet promises all data – including CAD data – at a glance. Routine changes and additions guarantee you the most up-to-date information at all times. Find out for yourself under [www.turck.com](http://www.turck.com)

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The VT250 allows various combinations of Profibus, Profinet, DeviceNet, Ethernet/IP, Modbus-TCP, CANopen and EtherCAT

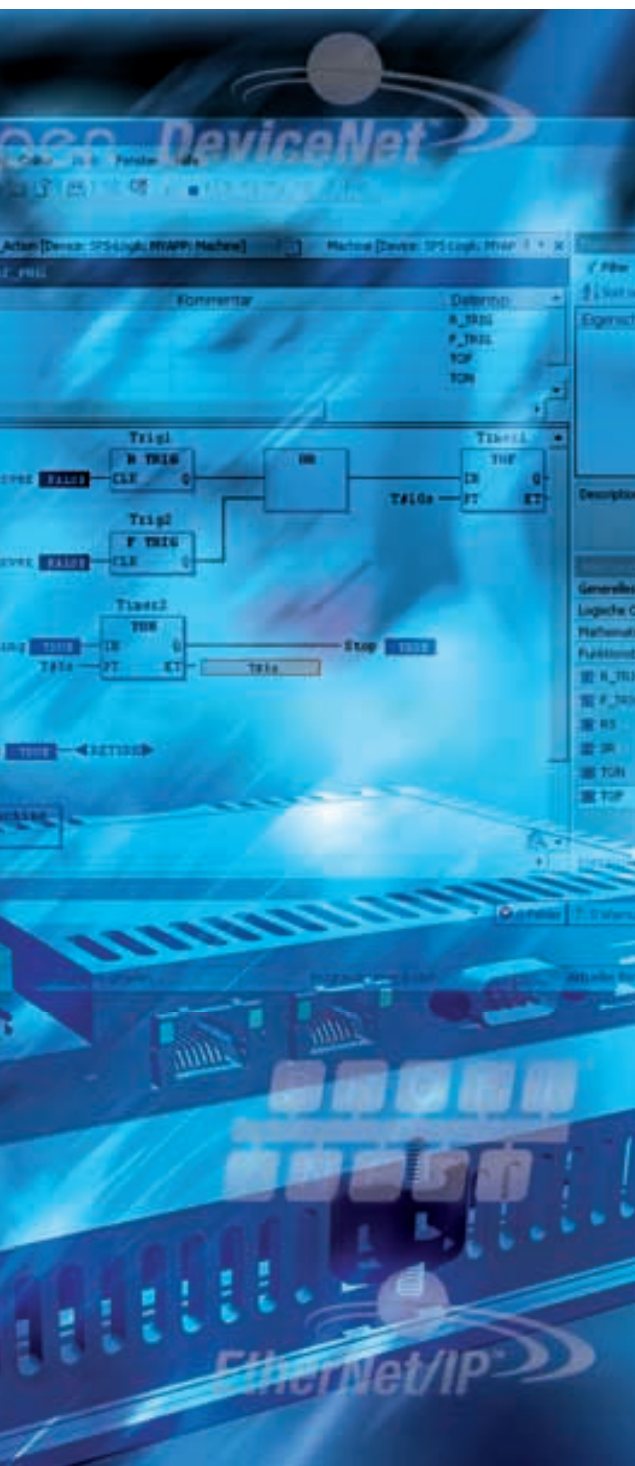
## Triple Play

New HMI series with controlling, visualizing and outstanding communication functionality emphasizes Turck's comprehensive solution know-how

**T**he human machine interface (HMI), the communication device between man and machine, will always play a major role for an efficient system operation – despite all automation efforts. In the past, huge switchboards were used to establish a communication channel between man and machine. Nowadays, most users rely on modern computer screens. They do so for a good reason: modern touchscreens with integrated PLC functionality provide a flexibility. New programming simplifies plant upgrades, and even simple signalers in the field may be replaced with small HMIs that

are more versatile and – thanks to decreasing prices for powerful microprocessors – becoming a less expensive option.

For decades, Turck has been working to develop a comprehensive knowledge in the field level, where sensors, fieldbus systems and PLCs work together. During this time, Turck has extended its sensor, interface and fieldbus portfolio with CoDeSys programmable gateways with integrated PLC functionality. This technology enables certain tasks to be performed directly in the field, like reading and writing RFID data carriers. These compact PLCs support



decentralized automation concepts. After intense market inquiries, Turck decided to extend its portfolio with a new HMI series that not only provides controlling and visualization functionalities but also outstanding communication characteristics. The first new model, VT250, will be launched at the SPS/IPC/Drives. Additional models will follow in 2010.

### Versatile interface

The VT250 features a 5.7-inch thin-film transistor touch-screen (QVGA) in a compact plastic housing.

### Quick read

There are quite a few vendors of human machine interfaces – HMIs for short – in the market, already. Nevertheless, Turck is expanding its portfolio with a new HMI series that combines controlling and visualizing functionality with outstanding communication characteristics – ultimately, this is what users can come to expect from a fieldbus specialist.

Its semi-standardized assembly dimension (212 mm x 156 mm x 50 mm) enables users to apply the new HMI to various applications in no time. Even the HMI's sophisticated back side provides a new practicability. Unlike many established HMIs, the VT250 allows accessing the SD memory card and the back-up battery from outside the housing, so users may replace both components without a hassle.

The well-protected, counter-sunk fieldbus port supports DeviceNet, CANopen and Profibus, and allows the sub-d 9-pin connector cable to be conducted in exactly the same direction as all the other cables. The HMI's bottom side provides a 24V power supply, a communication port supporting RS232 and RS485 (allowing integration of barcode readers, light screens and the like) and an additional USB port that may be used to install a new firmware, for example.

### All-rounder netX

Turck's new HMI features yet another highlight: Providing two real-time Ethernet ports, the VT250 enables users to set up a line topology; only very few HMIs on the market allow that. A netX series controller by Hilscher, that may be configured as master or as slave, provides enough power for communication between virtually every fieldbus and realtime Ethernet systems on a single chip. The netX controller allows various combinations of Profibus, Profinet, DeviceNet, Ethernet/IP, Modbus-TCP, CANopen and EtherCAT – and even Powerlink and Sercos systems can be integrated, if required. Another example of the controller's flexibility: The VT250 can be operated as a Profibus master and a Profinet slave at the same time – or in virtually every other combination of fieldbus and Ethernet protocols.

The 200MHz/32Bit RISC processor not only provides communication power, but also enough resources for the visualizing and controlling software that may be run on Turck's new HMI, as well. Hilscher's visualizing software, QVIS, is perfectly suited for this hardware, thus allowing to fully utilize the controller's computing power. QVIS enables the user to create and arrange graphical user interfaces and provides all functions of a modern visualizing system, such as alarm handling, composition management, password protection, history, trending and simulation. Thanks to an integrated variable interface for the CoDeSys controller that is also integrated into

The HMI's back side provides connectors for 24V power supply, a fieldbus port, two Ethernet-ports, a communication port supporting RS232 and RS485 and an USB port



the VT250, both systems work together perfectly – the more so as the run-time system CoDeSys SP is already implemented into the netX controller.

### Proven controlling solution

Like the programmable gateways Turck offers for its distributed I/O systems BL20 and BL67, the new HMI fully supports the very popular CoDeSys software. The hardware-independent application software enables users to create their own controlling solution. Based on the international standard IEC 61131-3, CoDeSys supports all common programming languages for this standard and provides complete backends – including compilers – for all common processor types. In this way, CoDeSys helps create and operate software controlling applications for virtually every possible hardware.

The VT250 is one of the first automation solutions to support CoDeSys V3. This version combines all of the proven software functionality with brand-

new options like object-oriented PLC programming. CoDeSys V3 supports the operating system Windows CE for mere visualizing applications; Hilscher's rcX operating system provides enough power for more complex controlling tasks.

### Solution know-how

With the new HMI series, Turck once again confirms its comprehensive solution know-how. The first model, VT250, excels in flexibility and superior communication characteristics. It provides application-oriented visualizing and controlling functionality with enough power to handle communication between virtually every fieldbus system and real-time Ethernet. The new HMI can even be configured as master or slave – regardless of the communication direction. The cooperation with a strong business partner, such as Hilscher, and open standards like CoDeSys (FDT/DTM will be supported in the future) guarantee cost-effective interface solutions made in Germany. ■



The QVIS software provides all functions of a modern visualization system



CoDeSys V3 promises proven functionality with new options like object-oriented PLC programming

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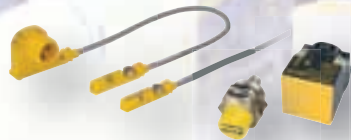
## Industrial Automation

# THE FULL RANGE

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### CONNECTIVITY

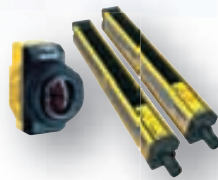
INDUCTIVE



FLUID



PHOTOELECTRIC



IP67



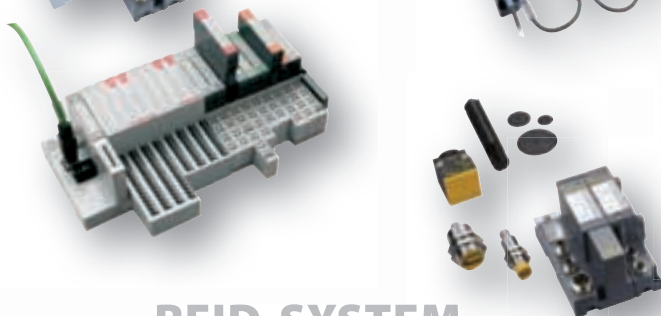
IP20



HMI



RFID-SYSTEM



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Also under the most adverse conditions. The complete programme includes sensors and components for all applications.

#### • Safe connections

From connectors right up to actuator/sensor boxes: The connection technology portfolio made by TURCK leaves nothing to be desired.

#### • Perfect transmission

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**Literally a long journey: The orchids are transported across the 15,000 square meter cropland for twelve months**



## Where Have all the Flow

Turck's RFID system, BL ident, facilitates highly automated orchid production in the East Friesian town of Upschört

**A** constant ambient temperature of 28 °C, along with a humidity of around 80 percent, are not exactly weather conditions to be expected in Eastern Frisia, Germany. However, right in the middle of the land between swamp and sea there are 15,000 square meters featuring an ever damp tropical climate. Here, in a huge greenhouse in the small town of Upschört, Jan Klusmann produces approximately one million orchids per year. Klusmann's horticultural farm specialized in breeding the queen of the flowers. Delivered as seedlings, the flowers are cultivated in the greenhouse for twelve

months before they grow for another 20 months in the main nursery in Westerstede. After this period of time, they are sold by garden centers and distributors all over Germany and Europe.

### Highly automated production

In order to be able to produce orchids at reasonable costs, Klusmann's horticultural farm must use a high degree of automation. Instead of providing watering for every inch of the cropland, Klusmann's orchids are transported to their watering place auto-



## ers Gone?



**Precise identification:** Each container carries a RFID tag on its bottom side



**While the preceding rollaway bed is watered, a succeeding container runs in**

### ► Quick read

Thanks to decreasing prices, orchids – oftentimes referred to as the queen of the flowers – have long since lost their exotic image. In fact, Orchidaceae has become one of the most common flowers on German sills. In order to keep prices reasonable, industrial flower production has to be highly automated. In a horticultural farm in the East Friesian town of Upschört, Turck's RFID system BL ident guarantees a highly transparent production process.

matically. Up to 1,500 rollaway beds containing the seedlings are routed across the facility by means of a slide rail system, arranged in ten pairs of two tracks for send-and-return movement. Routing on each pair of tracks is fully automated: The rollaway beds are transported from the cropland to the watering place, where containers can be extracted or inserted by a crane. This automated track system guarantees a low-maintenance orchid-cycle in which manpower is only needed for pricking out the seedlings. Each and every succeeding step – including repotting after six months – proceeds automatically.

Responsible for the electronic design and realization of the facility was Atlantique Automatisierungstechnik GmbH in Ihlow – a company specialized in automating horticultural farms. With its range of services – including design and construction of higher level control systems or switchgears, PLC and database programming, and assembly, conveyor and test technology – the automation specialists have worked with well-known customers in other industries, like automotive and engineering. The company's founder, Heinrich Winter, and his team have been engaged all over Europe. They even realized

Read/write heads of the Q80 family mounted at the front side of the greenhouse detect the RFID tags



“The decision [to implement Turck’s RFID components] turned out to be spot-on. The BL ident system can be parameterized way easier.”

**Heinrich Winter,**  
**Atlantique**  
**Automatisierungstechnik**

automation solutions for a horticultural farm in Israel. Their conception for the East Friesian facility: “Each and every container in the Upschört facility carries a RFID tag that allows precise identification by providing a unique ID,” says Winter. “Additional barcodes and container numbers written in plaintext enable the user to identify the containers using a hand-held scanner at any time necessary.” Scanners, PLC and cranes communicate wirelessly using a local area network.

### Database-driven production

A specially developed database records all relevant data from the greenhouse – from the orchids’ age, to the amount of water and fertilizer being applied, to the number of watering procedures applied. In this way, the computer operator can perceive each and every container’s status at a glance.

After past experiences with a competitor’s RFID system, Winter decided to implement Turck’s complete BL ident package into the new facility in Upschört. “We used a competitor’s system in a comparable facility in the past”, describes Winter. “This time, we decided to implement Turck’s RFID system instead, because of our positive experiences with Turck’s sensors. This decision turned out to be spot-on. The BL ident system can be parameterized way easier and all the hardware components that have to withstand the tropical climate are a real bargain compared to the competitor’s components.”

Each of the 1,500 containers carries a 30 millimeter tag on the bottom that can be read by the rugged read/write heads of the TN-Q80-H1147 line

at the watering stations at the front end of the track system. Four TI-BL20-DPV1 Profibus gateways (carrying two/four channel I/O cards) transfer the RFID data to the database.

### Reliable in harsh locations

Turck’s fully encapsulated RFID tags and the corresponding read/write heads turned out to be equally ideal for use in the East Friesian rainforest as the rugged, inductive sensors of the uprox family. Neither mud nor water, humidity or the ambient temperature of 28 degrees Celsius could keep the reliable components from working. True to Turck’s motto: Turck works! ■



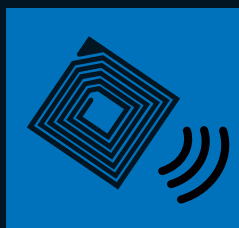
**Four TI-BL20-DPV1 Profibus gateways transfer the RFID data to the database**



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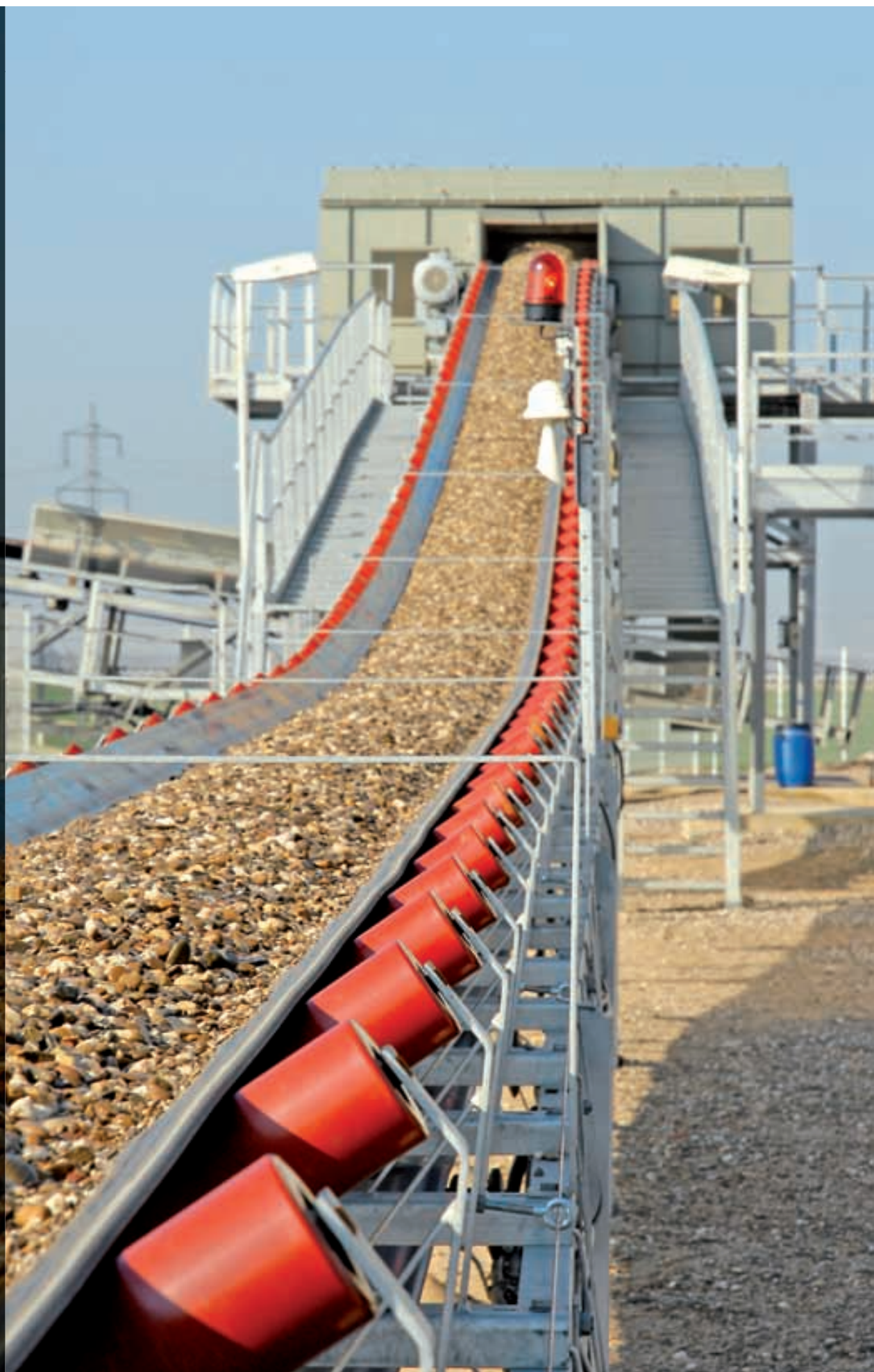
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Hülskens digs several hundred tons of sand and gravel out of the Lower Rhine plain every hour – processing would be impossible without an automated transport system



Rugged uprox sensors monitor all the butterfly valves' end positions – contact-free, wear-free and with the highest switching distances

## Worthwhile Digging

Turck's factor-1 sensors, rotational speed monitors and rotary position sensors guarantee efficient resource processing in a new gravel pit on the Lower Rhine

**S**and and gravel are important resources for the modern building and construction industry, which could not exist without them. Coming in different particle sizes of less than a millimeter to several centimeters, the resource is fundamental to buildings, roads, bridges or custom-designed backyards.

A widespread gravel pit can be found on the Lower Rhine, where sediments from Taunus, Hunsrück, Sauerland and Eifel came to rest. At this very place, Hülskens digs up to 800 tons of sand and gravel out of the Rhine's floodplains and inward areas every hour. After digging the sediments out of the Lower Rhine plain with huge swimming multi-bucket excavators, the unsorted pieces of rock are transported to the processing facility via conveyor belts. Here, the sediments are stored temporarily on a crude gravel stockpile. Afterwards, the sediments are washed, drained and sorted in seven steps according to their particle size. The different grain sizes are subsequently transported to huge silos that feed a subterranean mixing facility. Here, just below Earth's

surface, individually ordered gravel compositions are produced – whether construction gravel for new buildings or special compositions for concrete goods such as paving stones. "We produce compositions for the entire construction industry in Germany and in neighboring countries," says Hermann Kerkenpass, Electrical Engineering Master Technician with Hülskens. "Depending on the customers' demands, we are able to produce various compositions with grain sizes between 0.05 and 32 mm."

### Quick read

Near Rheinberg, Germany, the Hülskens GmbH & Co. KG digs several hundred tons of sand and gravel out of the Lower Rhine plain every hour. Turck's sensor solutions allow a safe and reliable transport, processing and stocking system even under the harsh environmental conditions in a gravel pit.



**Hülskens monitors the mile long transport system with sensor technology made by Turck**

### Mile-long transport system

A cornerstone for the automated processing facility is a mile long transport system that enables Hülskens to operate the facility with only 22 employees working a two-shift operation. Sand and gravel pass each and every processing station on collating conveyors – from the actual gravel pit to the crude gravel stockpile, from the stockpile to the washing and draining facility, from there to a total of twelve silos, and finally to transport ships standing by.

This transport system and each and every processing station have to be monitored at all times, because a single conveyor breakdown might disrupt the entire production process. Hülskens uses Turck's sensor solutions to guarantee the plant's availability even under high mechanical stress induced by stone impacts, dampness or frosted conveyors. A total of approximately 150 uprox sensors monitor all the mechanical plant components' end positions – at the silos' feed units, the subterranean feed stations and the drives' hydraulic system.

Turck's factor-1 sensors do not have a ferrite core and thus provide the same switching distance for all types of metal – making them perfectly suited for use on butterfly valves. Here, the sensors guarantee that the different grain sizes are transported to their corresponding silos. Ultimately, they ensure a precise mixing process at the subterranean feed

stations where sand and gravel have to be added to the conveyor in just the right amounts.

The inductive threaded pipe sensors detect the butterfly valves' end positions (opened/closed) via small metallic pennants that enter or leave the sensors' detection area depending on the actual end position. Although this might seem like a simple task, the environment requires a highly reliable sensor solution. "The best possible switching distance is extremely important for our facility, because it guarantees that the sensors do not break down under high mechanical stress," says Kerkenpass. "The smaller the switching distance, the more likely a blockage becomes."

### High flexibility

Turck's uprox sensors allow non-flush, flush and counter-sunk mounting and negate the use of common ferrite core sensors with their 250 percent higher switching distances. Thanks to flexible mounting options, outstanding magnetic field immunity and EMC compatibility, uprox sensors are highly applicable in many industry.

Just a few sensor models, featuring the standardized chromed M30 x 1.5 brass tube, have enabled Hülskens to realize an efficient position monitoring system – reducing storage and maintenance costs for the plant's electronics. Turck's rotational speed monitors quickly turned out to be



**Rotary position sensors (bottom right) and inductive threaded pipe sensors (top left) continuously monitor the transport system and allow automated mixing processes**

equally applicable. Hülskens uses Turck's sensor solution for monitoring the conveyors' speed at their shaft drives. The rotational speed monitors detect the drive wheel's rotation via small metallic pennants that periodically energize an integrated inductive sensor. The resulting pulse repetition is continuously checked against an adjustable reference value. In this way, only a few rotational speed monitors enable the operators to check the conveyors' speed – since rotational frequency and conveyor speed are linear.

The easy-to-use sensors feature another big advantage: Thanks to status LEDs and an integrated potentiometer that can be found on the sensor's backside, the user may configure the sensor directly on-site. "This enables us to adjust the sensor with a screwdriver and without removing the protective grid," says Kerkenpass. "The LEDs do not soil, but remain clearly visible and the potentiometer notch does not fill with water – since the sensors are mounted horizontally."

### Wide operation range

Thanks to their wide operation range of 0.05 to 50 Hz, Turck's rotational speed monitors allow setting up various reference values and their rugged IP67-rated housing guarantees fault-free operation even in harsh environments. This is extremely important during the winter period, when frozen water might

influence the drive wheels' function. Allowing fast and systematic troubleshooting, the monitoring solution ultimately contributes to the plant's availability – since conveyors running too fast or too slow inhibit precise mixing processes.

To provide even more reliability, Hülskens complements the inductive monitoring principle with incremental rotary position sensors being applied to the subterranean feed units. The sensors provide additional information about covered distances – which is equally vital for precise mixing processes. It is the perfect coordination of the end position monitoring system applied to the feed units and these rotary position sensors that enables Hülskens to produce virtually every possible gravel composition – fully automated and highly reliable.

### Easy to work with

Hülskens has been using Turck's sensor solutions for around five years and did not encounter "any problems at all". Kerkenpass does not only appreciate the sensors' functionality: "Turck certainly is committed to its products – while others are not. Turck's specialists immediately help us with occurring questions – others did not. One manufacturer once simply told us to contact the distributor in case of problems. Turck, on the other hand, provides solutions even in case of unpredictable problems such as lightning strike." ■



“The best possible switching distance is extremely important for our facility... The smaller the switching distance, the more likely a blockage becomes.”

**Hermann Kerkenpass,  
Hülskens**

# Safety in the Melting-Pot

Intelligent temperature and flow sensors by Turck monitor a Chinese steel work's cooling water system

**A**n iron melting furnace is literally a hot spot. Inside these huge electric furnaces metals, such as chrome or nickel, and nonmetals, such as carbon, are melted into different alloys at temperatures of up to 3,800 °C. Depending on the concentration of carbon and additional components, cast iron and different types of steel can be distinguished.

The Jiuquan Iron & Steel Group Co. Ltd. (Jisco) specializes in producing ferrous alloys. Inside the steel work's electric melting furnaces – located in the North-Western Gansu province – around 13 million tons of semi-finished products, such as huge steel plates used in shipbuilding or hoops, coils or strand castings used in pipelines or building construction, are being produced each year. Whether heavy plate

or coil, Chinese steel work or German smeltery, iron melting furnaces require an efficient and error-free cooling system at all times. Access opening, closure head, gaskets, busbar and props have to be cooled continuously to keep the melting furnace functional for a long time. Since cooling the electrode – one of the most vital components – reduces oxidation waste on the surface, an efficient cooling system ultimately reduces abrasion and maintenance costs.

## Continuous monitoring

The coolant's temperature and its constant flow rate are vital parameters that have to be monitored continuously to keep the cooling system functional. For this purpose, Jisco has been using approximately

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Efficient cooling required: The Jiuquan Iron & Steel Group produces approximately 13 million tons of semi-finished products a year





**Turck's temperature sensors enable the maintenance personnel to check the coolant's temperature directly on-site and program the probe's switching points with only three pushbuttons**

500 intelligent temperature sensors and the same quantity of flow sensors made by Turck since 2008. In China, these automation solutions are sold by Turck's subsidiary Turck (Tianjin) Sensor Co. Ltd. (TTS). Since monitoring the cooling system does not require a highly accurate flow measurement, but a reliable threshold detection, Turck's FCS insertion

## Simple programming

Turck's TS-series temperature sensors have turned out to be a reliable monitoring solution for the Chinese steel company too. First, because they enable the maintenance personnel to check the coolant's temperature directly on-site. Secondly, because they allow programming the probe's switching points with only three pushbuttons; no additional soft- or hardware needed. Another highlight: The processing units feature a wide temperature range of -50 to 500 °C providing a switching and an analog output, and are available with re-programmable output and switching logic as well.

In addition to the remote access via Siemens' S7 PLC, Jisco's maintenance personnel may check the cooling system directly on-site using Turck's reliable TP, TS and FCS families. Reduced maintenance work ultimately enables Jisco to reduce the total cost of ownership. "Quite a few established temperature sensors can not be handled intuitively. Turck's intelligent temperature sensors are highly functional, allow flexible programming and are still easy to handle," says Jisco's Zhidong Wang. ■

### Quick read

Temperature and flow rate are two of the most vital parameters for efficient cooling systems – whether in Chinese steel works or in German smelteries. Turck's intelligent temperature and flow sensors have been enabling the Jiuquan Iron & Steel Group Co. Ltd. (Jisco) to prevent expensive down-times and guarantee safe plant operation for more than a year. Ultimately Turck's sensor solutions have enabled Jisco to reduce maintenance costs, too.

sensors have quickly turned out to be a reliable and cost-effective solution. Unlike mechanical flow sensors, these calorimetric sensors do not feature moving components.

Featuring a standardized design, FCS sensors measure the surrounding liquid's temperature via a flow-dependent voltage difference between two resistors. This difference remains constant if the liquid does not flow; if the liquid flows, the voltage difference changes. Thanks to the rugged and compact IP67 housing featuring an integrated processing unit and status LEDs, the FCS sensors enable the user to configure all settings directly through an integrated potentiometer.



**The calorimetric FCS sensors allow maintenance-free operation and on-site configuration**

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Designers trusted the new coal production site to fieldbus technology



# Coal for Chongqing

Chinese plant designers trust their new coal production site to Turck's rugged fieldbus system BL67

In order to cover the constantly increasing demand for energy, China has continuously been expanding its coal production capacities. One of the beneficiary cities is Chongqing – one of China's so called direct-controlled municipalities (besides Beijing, Tianjin and Shanghai). Being home to more than 32 million people, the independent administra-

tive unit is the largest city worldwide. Its land area (around 82 square kilometers) is just a little smaller than Austria's entire land area.

In autumn 2006, the Shandong Electric Power Engineering and Consulting Institute (SDEPCI) began expanding the Yongchuan plant's capacity with another two 135 MW units for processing lower quality coal. The project was funded by the China Power Investment Corporation and the Chongqing Jiulong Power Co. Ltd. After a project duration of 16 months, both plants went online in January 2008.

Extensive transport system run through the entire plant in order to transport the coal from its repository to the coal mills that precede the burning kilns. This transport system has to be reliable at all times, in order to guarantee an unobstructed plant operation.

## Quick read

In order to guarantee a reliably running transportation system in spite of the harsh environments, plant designers decided to implement the peripheral devices via a fieldbus system. Turck's established BL67 series won the race.

This is why the plant designers made great demands on the automation solutions being used. Ultimately, countless sensors and actuators spread all over the plant area have to be operated despite dust, dampness, vibrations, noise or electromagnetic interferences.

A conventional automation architecture would not have met these demands, which is why the plant designers chose a modern fieldbus system for the signal transmission between the PLC and sensors/actuators. The proper fieldbus system – featuring a modular design and IP67 protection – not only guarantees interference-free communication between all devices involved, but it also provides a high degree of data integrity, protection against vibration and extensive diagnostic functionality.

## Defying dust and vibration

After analyzing fieldbus systems from different producers, the plant designers of Shandong LuNeng Engineering Co. Ltd. – entrusted with engineering and commissioning the new plant's automation solutions – chose Turck's BL67 series. In order to guarantee reliable operation in spite of dust and vibration, plant designers decided not to abandon IP67 protection – although each and every fieldbus station was to be installed in a control cabinet. Turck's fieldbus system convinced the plant designers with another option: single I/O modules can be swapped in full operation. In this way, BL67 allows plant operators to replace broken I/O modules and avoid expensive downtime. Short-circuit protection and distinct diagnostic functionality that provide a quick status overview complete the system's comprehensive safety equipment. Thanks to its modular design, the BL67 system can simply be expanded if necessary – whether digital, analog, temperature or other signals need to be integrated.

The entire coal plant incorporates two transport stations, two coal mills crushing the combustible in two steps and a coal bunker from which the coal dust is blown into the burning kilns. Between these stations, the coal is transported via 14 conveyor belts. Each conveyor belt features its own control cabinet that incorporates connectors, motor-circuit switches and the BL67 stations. The modular I/O stations transfer all the analog and digital signals that reflect the transport system's status – whether rate of feed, offset, distension, cracks or fill level data. The fieldbus stations are connected to the higher level PLC, Control Logix 5560 by Allen Bradley, via DeviceNet. After evaluating the obtained data, the PLC submits the plant's status to the management information system (MIS). The plant designers implemented a total of two fieldbus networks – one covering 900 meters and the other covering 400 meters.

Turck's BL67 system absolutely convinced the planning engineer, Xiangyang Bai, ultimately ensuring future cooperations with Shandong LuNeng Engineering: "BL67 is a very good fieldbus solution that we are already planning to use in future projects," says Bai.

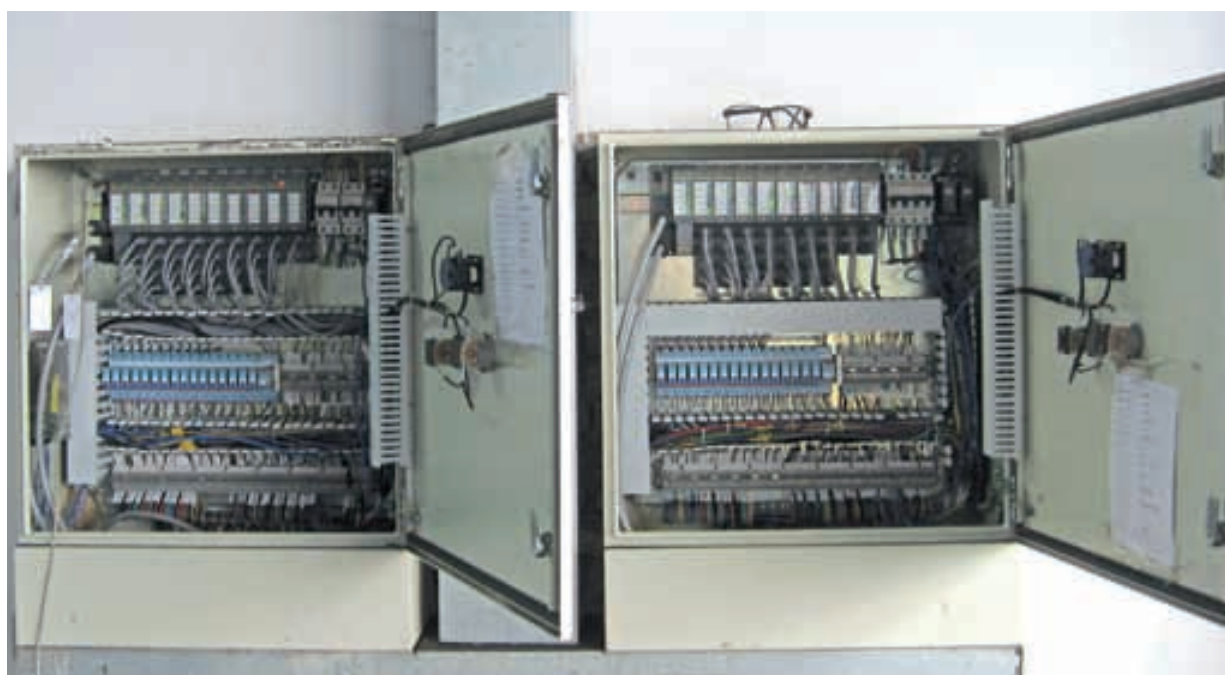
## The best backup

To guarantee continuous transportation of coal, designers trusted the Chongqing Yongchuan coal production site to the reliable, efficient and flexible fieldbus technology that provides error-proof combustible production. In Turck's IP67-rated fieldbus system, BL67, designers found a powerful solution that meets the highest demands. BL67 provides a high degree of reliability, simple maintenance and fast diagnostics, combined with easy and error free installation and low wiring costs – ultimately, the best backup a plant operator can have for the efficient and safe plant operation in harsh environments. ■



“BL67 is a very good fieldbus solution that we are already planning to use in future projects.”

**Xiangyang Bai,**  
Shandong LuNeng  
Engineering



A total of 14 BL67 fieldbus stations coordinate the DeviceNet data transmission between field devices and the higher level PLC by Allen Bradley

# Small Size, Big Power

High performance conveyor system uses Turck's IP67 rated power supply that withstands high pressure washdowns and doesn't require an enclosure

**F**ood and beverage manufacturers need systems to move their products throughout the plant. That's where DCC Automation, a division of Dairy Conveyor Corporation, steps in. Located in Brewster, New York, DCC has been designing, engineering, manufacturing and installing conveyor systems – for dairies, citrus products, juices and frozen foods – for over 50 years. Dennis Scott, Application Engineer with DCC, says that they appeal to a market that demands higher longevity and performance from conveying systems. “More often than not, the market sector we serve – stainless steel food oriented conveying systems – will opt for a more productive and durable solution,” says Scott.

The key to DCC's success is a stainless steel conveyor system that is able to withstand the soapy, hot, high pressure washdowns called for in the food industry. DCC has improved on their stainless steel system by introducing a zero-pressure accumulation

conveyor, coined Aqua-Zone. Zero-pressure accumulation is a method of accumulating product on the conveyor without the pressure of the products causing a pile-up on the system. Zero-pressure accumulation was introduced into the market about 20 years ago as a way to manage the back and forward pressure of a product as it travels through a conveyor system, allowing products to be stopped with a gap between each product to prevent pressure buildup, and released sequentially in relation to the products down and up-stream from them. This let products move through the conveyor system without coming into contact with one another. The downfall was that this method contained a lot of mechanical parts that could breakdown with wear and it was expensive to institute. The present incarnation of zero-pressure accumulators use electrical equipment rather than mechanical, which are less susceptible to wear – and in the case of DCC's Aqua-Zone system – able to withstand washdown environments.

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**Wear-free:** ACC's zero-pressure accumulation conveyor uses electrical equipment rather than mechanical





**Turck's power supply is about one-third of the footprint of an enclosure**

DCC designed the Aqua-Zone system by employing a series of washdown resistant electronic vision sensors with onboard logic that monitor and control independently driven accumulation zones, and then deliver (or remove) drive force from specific accumulation zones depending upon product flow conditions. The Aqua-Zone module monitors both its own zones status, as well as the status of the next downstream zone. Based upon this information, the module provides drive force to its respective zone length.

## The Zone concept

When a product is sensed and accumulated in zone "A", the zone "A" module delivers an output signal to the module in zone "B". As soon as the product enters zone "B" it is actuated, removing drive force and stopping product in zone "B". Simultaneously the zone "B" module delivers an output signal to the zone "C" module, so this accumulation process may repeat upstream. When zone "A" clears, the output signal from the zone "A" module to the zone "B" module is removed, and drive force is reinstated to zone "B". Once zone "B" clears, the zone "B" module delivers an output signal to the zone "C" module so the zone release process may be repeated upstream.

In order for DCC to introduce the Aqua-Zone system into washdown or high moisture environments, it first had to ensure that all the parts incorpo-

rated into the system were able to withstand these conditions, which led them to Turck. "For our stainless steel zero pressure accumulation conveyor, we were looking for a high quality, compact, 24V power supply that would withstand frequent washdowns and exposure to moisture without requiring a separate water tight enclosure," says Scott.

DCC chose to implement Turck's IP67 rated power supply for its Aqua-Zone system. The Turck system supported all of DCC's power requirements, along with providing appealing mounting possibilities due to its compact footprint. The power supply is mounted underneath the conveyor which provides a measure of protection from the water and spray, but is still able to be monitored by plant personnel when the conveyor systems are mounted overhead, as they often are in the food sector. "DCC has a quality and performance oriented mindset, which is why many of our clients seek us out in the first place. Turck's innovative design fit our high standards for the equipment that is used on our systems," adds Scott.

"If it weren't for Turck, we'd have to use a NEMA 12, non-water proof power supply and mount it in an enclosure," Scott continues. "Not only have we saved the cost of the enclosure, we don't have to worry about leakage or not properly sealing the enclosure. Since Turck's power supply is about one-third of the footprint of an enclosure, we were able to mount it in an area that is more convenient for the customer to access." ■



**“If it weren't for Turck, we'd have to use a NEMA 12, non-water proof power supply and mount it in an enclosure. Not only have we saved the cost of the enclosure, we don't have to worry about leakage or not properly sealing the enclosure.”**

**Dennis Scott,  
DCC**

## ► Quick read

Manufacturers of the food and beverages we consume every day must adhere to stringent requirements in order to produce products that are safe for us to consume. There are many checks within the system, including frequent cleaning by high pressure washdowns to maintain sanitary conditions within the plant. Developing machinery that can withstand such cleaning is not an easy feat, considering that a lot of electronics are not designed to get wet or to function in high moisture environments.

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**Made of steel: Turck is the first vendor to offer a fully metal stainless steel ultrasonic barrier sensor, M25U, for aseptic applications**



## How ultrasonic sensors work...

Part 6 of our basic series on the design, functional principles and application options of the most important sensor technologies

**U**nlike many other sensor technologies, the ultrasonic measuring principle does not primarily rely on the target's material or aggregate state; its surface properties are much more important. The smoother and harder the surface is, the better it reflects incoming ultrasonic waves, which results in a better operating range. Liquid surfaces feature pretty much the same reflectivity as hard, smooth objects. Surfaces with a scallop height of more than 0.15 mm do not reflect incoming waves that good, but they do not have to be adjusted to the sensor very accurately either. Another important influencing factor is the

object's temperature, since hot surfaces feature a better reflectivity than cold surfaces. Finally, even the ambient air temperature and humidity contribute to the sensor's operating range. The object's color, on the other hand, does not influence its reflectivity and even transparent objects such as glass or Perspex can be detected reliably.

Ultrasonic sensors are mainly used in the diffuse mode. An object in front of the sensor is detected by its reflection of a part of the emitted sound waves. Continuously switching between emitting and receiving mode, an integrated sonic transducer detects these reflections. The sonic transducer takes a cer-

tain time to steady after oscillations; this time is decisive for the sensor's blind zone. Within this zone – located directly in front of the sonic transducer – the interval transit time cannot be measured, which is why this blind zone should be kept clear at all times.

It is also possible to use ultrasonic sensors in the opposed or reflective mode. An opposed mode sensor consists of an emitter and a receiver that “listen to each other” permanently. The ultrasonic sound is interrupted by an object between the emitter and the receiver and consequently the sensor generates a switching signal.

The measuring range of ultrasonic sensors depends on the wavelengths and frequencies used for detection. The longer the wavelengths, the shorter the frequency, the bigger the measuring range. Compact sensors with wavelengths of only a few millimeters provide measuring ranges between 300 and 500 mm. Longer wavelengths of around five millimeters allow measuring ranges of more than eight meters. Among other factors, such as the wavelength, the accuracy of ultrasonic sensors is mainly limited by speed fluctuations of sound during temperature changes. Therefore most of the sensors feature temperature compensation. This enables analog Q45 sensors to achieve a repeat accuracy of up to 0.6 mm over a wide temperature range.

## Comprehensive portfolio

Turck's comprehensive ultrasonic sensor portfolio comprises various sensor solutions of its strategic partner, Banner Engineering. Banner Engineering is a leading producer of optoelectronic sensors worldwide. Turck's ultrasonic sensors with switching outputs are available in virtually all housing types. Certain housing types also come with two switching outputs – specially suited for minimum and maximum level control. Versions with an analog current or voltage output are available in most housing types too. Certain variants such as M18/30 and Q30 provide a very narrow sonic angle of approximately 6°. Therefore, these devices are specially suited for precise detection of relatively small targets. With angles between 12 and 15°, the sonic cones of Turck's Q45U and T30U sensors are significantly larger. The sensor type CP40 has an even wider sonic cone of 60°. These devices are suited for monitoring a large area or for the detection of smooth, flat and even tilted objects. Some ultrasonic sensors feature an external sonic transducer that is contained in a separate compact housing, while the electronics are still contained in the sensor housing. This separation is especially advantageous when mounting space is limited.

With almost all ultrasonic sensors, it is possible to adjust the lower and the upper limit of the switching or measuring range. Objects outside this range may be detected, but they do not initiate the output to change state. Certain models allow adjustment of several parameters, such as the sensor's response time, its performance during loss of the echo, or parameters for the direct operation of a pump con-



Thanks to the integrated temperature compensation, the new T30UX ultrasonic sensors provide more accuracy than comparable products



Turck offers sensor versions with an external sonic transducer for special applications too

nected to the sensor. Thanks to external programming devices, users may even set-up certain models with respect to hysteresis or responsiveness. Adjusting the average determination allows the operator to increase accuracy at the cost of the response time and vice versa.

## Noise suppression

Noise such as metal “clink” or roaring pressure do not influence the evaluation due to optimized selection options for the frequency range and the patented noise suppression circuitry. In most cases, sensor synchronization or multiplexing will prevent mutual interferences. Most sensors are capable of self-synchronization by simply connecting the synchronization line. Synchronized sensors emit sonic pulses simultaneously and, if mounted correctly, perform like a single sensor with an extended detection angle. This principle can be found in modern automobiles' park distance control systems. ■

### Quick read

Ultrasonic sensors are designed for contact- and wear-free detection of various targets by means of sonic waves. It is not important whether the target is transparent or opaque, metallic or non-metallic, solid, liquid or powdery. Environmental conditions such as spray, dust or rain hardly affect their function.

# Turck at Trade Shows

At numerous national and international trade shows, Turck will introduce you to current product innovations and reliable solutions for plant and process automation. Be our guest and see for yourself.

| Dates               | Trade Show                  | City, Country          |
|---------------------|-----------------------------|------------------------|
| 27.01. - 29.01.2010 | IFAM                        | Celje, Slovenia        |
| 25.02. - 28.02.2010 | World of Industry           | Istanbul, Turkey       |
| 03.02. - 05.02.2010 | Expo Solar & PV             | Ilsan, South Korea     |
| 03.03. - 06.03.2010 | Aimex, IBS, Robotis, Weltek | Seoul, South Korea     |
| 08.03. - 11.03.2010 | SIAF                        | Guangzhou, China       |
| 23.03. - 26.03.2010 | Automaticon                 | Warsaw, Poland         |
| 13.04. - 16.04.2010 | Amper                       | Prague, Czech Republic |
| 14.04. - 15.04.2010 | ISA                         | Edmonton, Canada       |
| 19.04. - 23.04.2010 | Hannover Messe              | Hanover, Germany       |
| 25.05. - 28.05.2010 | MSV                         | Nitra, Slovakia        |
| 11.05. - 15.05.2010 | Technical Fair              | Belgrade, Serbia       |
| 25.05. - 28.05.2010 | Kofas                       | Chungwon, South Korea  |
| 31.05. - 03.06.2010 | Eliaden                     | Lillestrøm, Norway     |
| 02.06. - 04.06.2010 | IAC, TME + Sensor           | Shanghai, China        |
| 08.06. - 10.06.2010 | Rax                         | Tel Aviv, Israel       |
| 13.09. - 17.09.2010 | MSV                         | Brno, Czech Republic   |
| 22.06. - 25.06.2010 | Expo Pack                   | Mexico City, Mexico    |
| 28.09. - 30.09.2010 | Assembly Technology Expo    | Rosemount, USA         |
| 19.10. - 21.10.2010 | ISA                         | Houston, USA           |
| 12.10. - 15.10.2010 | Vienna-Tec                  | Vienna, Austria        |
| 13.10. - 16.10.2010 | EloSys                      | Trencin, Slovakia      |
| 31.10. - 03.11.2010 | Pack Expo                   | Chicago, USA           |
| 02.11. - 04.11.2010 | Metalfarm                   | Atlanta, USA           |
| 23.11. - 25.11.2010 | SPS/IPC/Drives              | Nuremberg, Germany     |



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## Turck on the Internet

Whether sensor, fieldbus, interface or connection technology, in the product database on [www.turck.com](http://www.turck.com) you will find the right solution to your needs at the touch of a button. Three search functions will help you.

# Turck on Site

With 27 subsidiaries and numerous branch offices, Turck is always nearby, anywhere in the world. This guarantees fast contact to your Turck partners and direct support on site.

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